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UNITED STATES PATENT APPLICATION

of

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for a

MEDIA RESOURCE CARD WITH DYNAMICALLY ALLOCATED RESOURCE POINTS

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BACKGROUND OF THE INVENTION

Field of the Invention

The present inventions relates generally to the field of telecommunications and, more specifically, to a media resource card which may be used, in conjunction with a converged services platform, to provide a wide variety of enhanced communications services.

Background Information

A continuing trend of convergence between the circuit-switched public switched telephone network (PSTN) and packet-switched networks, such as Internet Protocol (IP) networks, has created demand for systems capable of interfacing with both types of networks while supporting a large number of diverse applications. Such applications include toll-free calling, wireless/wireline prepaid calling, directory assistance, voicemail, call centers, conferencing and many others. In order to support such diverse applications, it is generally necessary to provide a capability for performing DTMF tone generation/detection, voice recorded announcements and similar communications services. Such basic capability, conventionally packaged as a "card" or printed circuit board which interfaces with an industry standard bus, has been commercially available for some time from a variety of vendors including Intel Corporation and NMS Communications.

However, marketplace demands indicate that greater scalability, density, smaller packaging and greater performance/cost ratios are needed in order for telecommunication carriers and other service providers to operate profitably and to be in position to rapidly deploy new applications which represent new revenue sources. As a result, there is need

for greater flexibility and programmability in delivering the communications services which enable the applications.

SUMMARY OF THE INVENTION

In brief summary, the present invention provides a media resource card which, when integrated into a converged services platform, is operable to perform a variety of enhanced telecommunication services. Such services include tone detection/tone generation, conferencing, recording and playback, and numerous others.

Each media resource card is associated with a predetermined number of "resource points." As used herein, resource points represent a license or authorization level. In a preferred embodiment, resource points are maintained in a central system pool and the entire pool is available to any given media resource card. Preferably, in response to instructions from an application program, resource points from the central pool are dynamically allocated to a particular media resource card when needed to perform specific services. Additional resource points may be purchased by a customer and added to the central pool.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention description below refers to the accompanying drawings, of which:

Fig. 1 is a block diagram of a converged services platform which includes a media resource card constructed in accordance with a preferred embodiment of the present invention;Fig. 2 is a block diagram of the media resource card shown in Fig. 1;

Fig. 3 is a block diagram illustrating an arrangement for centrally pooling resource points and dynamically allocating such points among one or more media resource cards of the type shown in Figs. 1 and 2; and

Figs 4A and 4B are tables showing exemplary services that may be performed by a media resource card of the type shown in Figs. 1 and 2 and the number of resource points required for such services.

DETAILED DESCRIPTION OF AN ILLUSTRATIVE EMBODIMENT

Fig. 1 shows a converged services platform 2 which is controlled by an application program (not shown) running on a host computer 4. Hardware and software which may be used to implement a converged services platform of the type shown are available from Excel Switching Corporation of Hyannis, Massachusetts. With the inclusion of appropriate cards discussed below, platform 2 is capable of interfacing with both the PSTN 6 and an IP network 8.

As shown, platform 2 includes redundant switching buses 10a and 10b. Redundant CPU cards 12a, 12b are connected to buses 10a, an HDLC bus 14, and to host 4 by way of input/output (I/O) cards 16a, 16b. Depending upon the requirements of a particular application, various combinations of the following "line" cards, each of which supports a particular digital telecommunications protocol, may be included within platform 2: T1 card 16; E1 card 18, DS3 cards 20a, 20b. For redundancy, a standby card 22, which is a duplicate of one of the other line cards, may also be included. All such line cards have an associated I/O card, denoted collectively by reference number 26, which serves as an interface to PSTN 6.

If a particular application requires ISDN signaling, ISDN PRI cards 24a, 24b may be included within platform 2. Similarly, if a particular application requires SS7 signaling, SS7 cards 28a, 28b may be included. If a particular application requires IP media transport, platform 2 may include IPN cards 30a, 30b or an IPS card 32. Also, if a particular application requires media services, a media resource card 38 (or multiple cards 38 for redundancy or greater resource capacity or both) may be included. Cards 30, 32 and 38 each have an associated I/O card, denoted collectively by reference number 40. Power cards 34a, 34b and cooling fans 36a, 36b are also present within platform 2.

Referring now to Fig. 2, a detailed block diagram of the media resources card 38 is shown. A DSP module 44a includes four DSPs 46a-46d, each of which has an associated cache memory 48a-48d, respectively. Each of DSPs 46a-46d is preferably a Texas

Instruments TMS320C6414, but any of a number of other commercially available DSPs could readily be adapted for use with the present invention.

DSPs 46a-46d are connected to a time division multiplex (TDM) switch 50. Each of DSPs 46a-46d is capable of receiving and transmitting up to 512 DS0s (time-slots) from TDM switch 50. If desired, a second DSP module 44b, containing an additional four DSPs (not shown) may added to media resources card.

Overall control of the operation of media resources card 38 is carried out by a CPU 56, which is preferably a Motorola PowerQUICC 8260 processor, having an associated cache memory 58 and a local memory 60. CPU 56 also has an associated Ethernet network interface through which the CPU may communicate with a Network File System (NFS) file server 42. Any of a number of other commercially available microprocessors or other file system protocols, including CIFS or TFTP, could readily be adapted for use with the present invention.

Cache memories 48a-48d and 58 are preferably used to cache voice recorded announcements or other recordings which are intended for playback to callers (not shown) as directed by an application running on host computer 4 (Fig. 1). Large quantities of such voice recorded announcements may be stored on file server 42, in accordance with NFS, CIFS or another desired file system protocol, retrieved by CPU 56 and then cached at the time of initial playback.

With reference now to Fig. 3, an arrangement for centrally pooling and dynamically allocating "resource points" among one or more media resource cards 38. As shown, two media resource cards 38a and 38b are present and each such card has two DSP modules 44a-44d. In a preferred embodiment, when each of cards 38a and 38b is installed in a converged services platform 2 (Fig. 1), a total of 4096 default resource points per card are added to a central system resource point pool 62 maintained on CPU card 12a. The total points present in the pool 62, which is the sum of all default resource points plus any additional points licensed, are preferably available to any given media resource card 38. In response to messages received from an application running on host computer 4 (Fig. 1), CPU card 12a will dynamically allocate resource points among cards 38a and 38b. In a converged services platform employing multiple media resource cards,

redundancy is provided by automatically allocating additional resource points from the central pool to increase the performance of the remaining cards upon a media resource card failure.

In order to determine how many resource points are needed for a particular application, it is necessary to specify what services (*e.g.*, tone detection, tone generation, playback/record, etc.) are needed in a "worst case" or peak demand scenario. Based on that specification, one may refer to the tables of Figs. 4A and 4B to determine how many resource points are needed for each service. By multiplying the required services by the required resource points, a maximum resource point total is obtained. If the maximum resource point total is equal to or less than the total default resource points represented by media resource cards 38, then no additional resource points are needed. If the maximum resource point total is greater than the total default resource points, then the customer may license additional resource points.

What is claimed is: